

Fit With Fiber

Graphing Cereal

Skills: Science and Math

Objective: Students gather and graph information about favorite breakfast cereals.

Background

Fiber is present in all plants that are eaten for food, including fruits, vegetables, grains, and legumes. Fiber passes through our bodies undigested. It is therefore not absorbed into the bloodstream. Instead of being used for energy, fiber is excreted from our bodies.

Not all fiber is the same. One way to categorize fiber is by how easily it dissolves in water. Soluble fiber forms a gel when mixed with liquid, while insoluble fiber does not. Insoluble fiber passes through our intestines largely intact. The skin of a plum is an example of insoluble fiber, while the pulp is a source of soluble fiber. Both kinds of fiber are important in a healthy diet. They help the body function more efficiently and reduce the risk of heart disease, diabetes, and diverticular disease.

SOME SOURCES OF FIBER

SOLUBLE FIBER	INSOLUBLE FIBER
oatmeal	whole wheat breads
nuts and seeds	barley
legumes—dried peas, beans lentils	couscous
apples	brown rice
pears	bulgur
strawberries	whole grain cereal
blueberries	tomatoes
blackberries	carrots
plums	zucchini

Source: Harvard School of Public Health, <http://www.hsph.harvard.edu/nutrition-source/fiber.html>

P.A.S.S.

GRADE 6

Science Process—4.1,2,3; 5.2,3

Life Science—4.1

Math Process—1.2,6; 2.2; 3.3;
4.1; 5.4

Math Content—2.3; 5.1

Health—1.8,11

GRADE 7

Science Process—4.1,2; 5.2,3

Life Science—4.1

Math Process—1.2,6; 2.2; 3.3;
4.1; 5.4

Math Content—2.1b

Health—1.8,11

GRADE 8

Science Process—4.2,3; 5.2,3

Life Science—3.1

Math Process—1.2,6; 2.2; 3.3;
4.1; 5.4

Math Concept—2.1b; 5.1

Health—1.8,11

Resources Needed

computer access

cereal boxes
(five different examples)

compass

protractor

ruler (straight edge)

map pencils

Oklahoma-Grown Fiber

An important source of insoluble fiber is the hard winter wheat grown by Oklahoma farmers and by farmers in 42 states throughout the United States. US farmers grow nearly 2.4 billion bushels of wheat on 63 million acres of land. Oklahoma is normally the second ranking state in winter wheat production. Hard red winter wheat, the primary class of wheat, is grown on over 6 million acres in every county of the state. In an average year, over 160 million bushels of wheat are harvested, with a yield of around 35 bushels per acre. Some of the wheat grown in Oklahoma is used to produce flour in the state's flour mills. The rest is exported to other states or foreign countries. About forty-five 24-ounce boxes of wheat flakes cereal can be made from a bushel of wheat.

Many crops grown in Oklahoma are sources of soluble and insoluble fiber. Hard red winter wheat, our number one crop in 2006, is used to make whole wheat breads and cereals. Some other crops grown in our state that are good sources of fiber include vegetables, like tomatoes and squash; legumes, like black-eyed peas and lima beans; and fruits, like peaches, plums, apricots, strawberries, blackberries, apples and pears.

Children over the age of two should consume an amount of fiber equal to or greater than their age, plus five grams per day. For example, a 12-year old would need to consume 17 grams of fiber per day. The average American eats only 14-15 grams of dietary fiber a day. Background Sources: Harvard School of Public Health; "Kids Health" website; Nutrition.about.com; AskDr.Sears.com; General Mills Foods; Oklahoma Wheat Commission; Oklahoma Department of Agriculture, Food and Forestry; Glencoe Life Science

Activities

1. Read and discuss background.
 - Ask for a show of hands to determine how many students ate breakfast.
 - As a class, compute what percentage of the class ate breakfast.
2. Discuss graphing, using the information on the Circle Graph page and the information on graphs found in the "Resources" section.
3. Show students the five cereal boxes you have brought to class.
 - Poll the class regarding their favorites among the five.
 - Use tally marks to keep track on the chalkboard.
 - Students follow instructions on the worksheet to record the results of the poll on the circle graph.
4. Analyze the nutritional information of the cereal choices.
 - Make a copy ahead of time of a nutritional value label from a cereal box.
 - Draw arrows on the label pointing to fiber, calories, serving size, fats and carbohydrates, so students will know what to look for.
 - Show students the nutrition charts on cereal boxes you have brought to class.
 - Discuss the information.
 - Students use an online search engine to find the company that produces the five cereals.
 - Students find the nutritional information for each cereal.
 - Students chart the amount of dietary fiber in each of the cereals chosen.
 - Students use the information to make a bar graph showing the amount of dietary fiber in each cereal. (In a bar graph the x-axis variable is divided into parts. The parts can be numbers or nutritional information. The y-axis is a number and increases continuously along the axis.)

Vocabulary

bulgur—dried cracked wheat

diabetes—an abnormal bodily condition in which less than the normal amount of insulin is produced

diverticular—an abnormal pouch or sac opening from a hollow organ (as the intestine or bladder)

fiber—mostly indigestible material in food that stimulates the intestine to move its contents along

insoluble—impossible or difficult to dissolve

soluble—capable of being dissolved in a liquid

5. Students analyze the graphs and decide which cereals have the healthiest amount of dietary fiber.
—Students reflect on and justify the reliability of their graphs.
6. Students find the first ingredient listed for each cereal.
—Discuss why the first ingredient is listed first. (The ingredients with largest quantities are listed first.)
—Students will read through the list of ingredients to find those that might be considered sweeteners (sugar, fructose, corn syrup, etc.)
—Discuss how near to the beginning of the list sugars are listed.
7. Discuss additional nutritional facts for each cereal, including calories in each serving, serving size, fats and carbohydrates.
—Students complete a second circle graph, which will show the daily percentages of sugar and calories/carbohydrates/fat from each serving of cereal.
—Students discuss findings and explain why they agree or disagree with the graphs presented.
8. Have newspapers delivered to your class (usually free for classrooms).
—Students will find examples of graphs in the newspapers and cut them out.
—Discuss other places students have seen graphs used (magazines, doctor's offices, informational brochures, textbooks, etc.)
9. Each student will write a letter home explaining the benefits of fiber and suggesting some fiber-rich foods to add to the household grocery list.

Extra Reading

Haduch, Bill, and Rick Stromoski, *Food Rules! The Stuff You Munch, Its Crunch, Its Punch, and Why You Sometimes Lose Your Lunch*, Puffin, 2002.

Inglis, Jane, *Fiber (Food Facts)*, Carolrhoda, 1993.

Lackey, Jennifer, *The Biography of Wheat (How Did That Get Here?)* Crabtree, 2007.

Royston, Angela, *Water and Fiber for a Healthy Body (Body Needs)*, Heinemann, 2003.

VanCleave, Janice, *Janice VanCleave's Food and Nutrition for Every Kid*, Jossey-Bass, 1999.

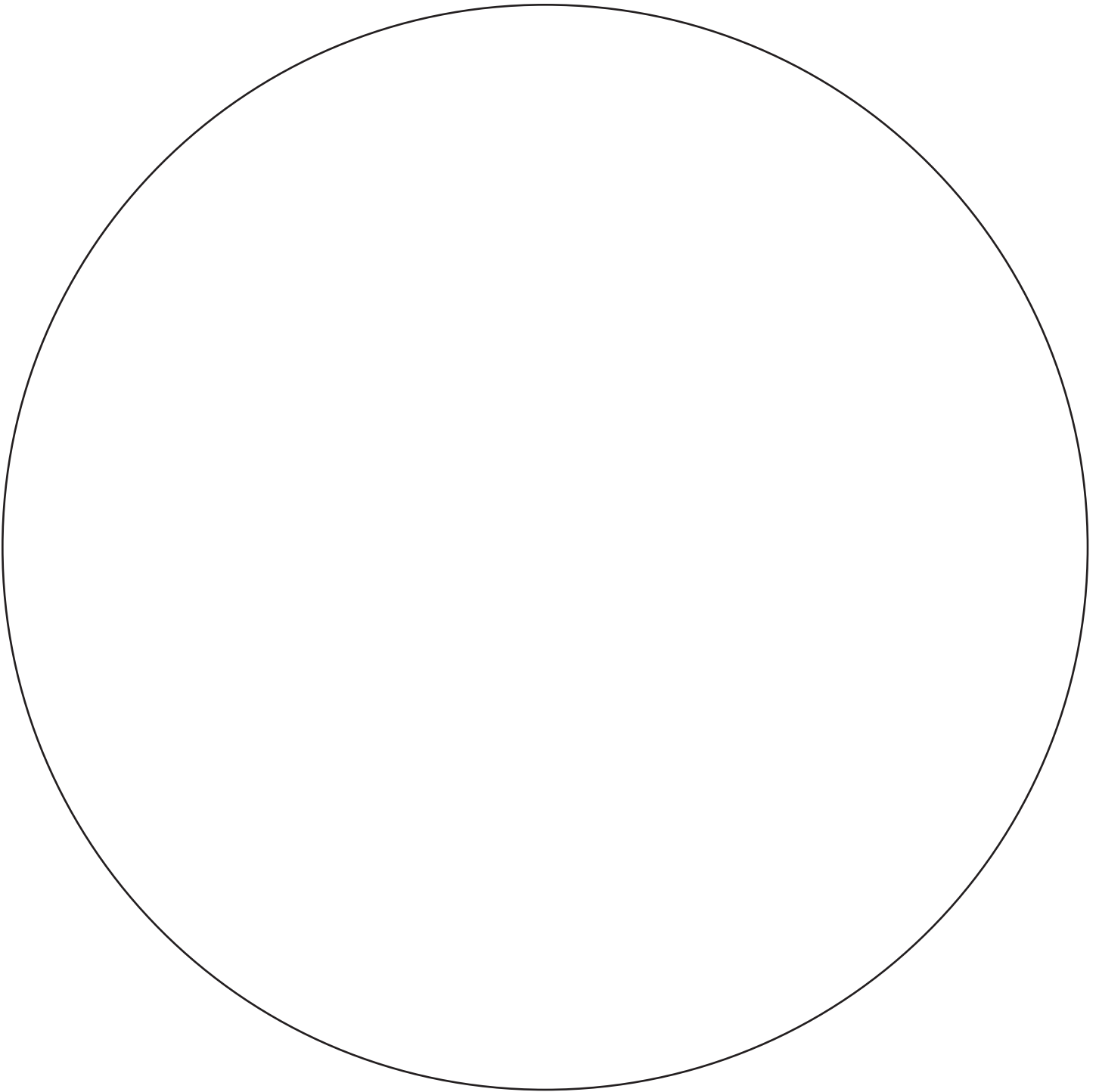
Waxman, Laura Hamilton, W.K. Kellogg (*History Maker Bios*), Lerner, 2006.

Circle Graph

Graphs display data as an easy-to-understand visual reference. Sometimes the translation of data into text becomes confusing. Graphs make it easier to understand complex information or view the results of an experiment. A bar graph uses rectangular blocks, or bars, of varying sizes to show the relationships among variables. One variable is divided into parts. It can be numbers, such as the number of students preferring certain cereals, or a category, such as the type of cereal preferred. Circle graphs show the parts of a whole. Circle graphs are sometimes called pie graphs. Each piece of the pie visually represents a fraction of the total. Each piece can represent what percent of the class chose which cereal.

1. First determine the total of the parts (total of votes for the five top cereals).
2. From the total votes for each of the five cereals, determine what fraction they are of the total.
3. Assume 360 degrees in a circle.
4. Determine what fraction of 360 each part would be. To determine this, set up a ratio and solve for x:
$$\frac{\text{part}}{\text{whole}} = \frac{x}{360} \quad x = \text{the degrees of the circle that each cereal represents for the class.}$$
5. Use a compass to mark the center of the circle.
6. Draw a straight line from the center to the edge of the circle.
7. Use a protractor and the angles you calculated to divide the circle into parts. Place the center of the protractor over the center of the circle and line the base of the protractor over the straight line. Continue around the circle until 100% is complete.
8. Color each piece of the pie graph and label.

Name _____



Name _____

Fit With Fiber Worksheet

Name of Cereal	grams of fiber/serving
1.	
2.	
3.	
4.	
5.	

Observations about each cereal (texture, color, smell, taste, etc.)

Other details of interest from the food label (calories/serving, amount of iron/serving, etc.)

Make a bar graph detailing the amount of fiber per serving in each cereal.